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Research Interests and Skills

Physics of top quark and electroweak symmetry breaking. Search for new phenomena. Real-time systems, data acquisition, control systems, and instrumentation. Probability theory, statistics, and data analysis. Software engineering and scientific computing.

Professional Preparation and Qualification

Education

Apr 2008 Ph.D. in Experimental High Energy Physics,
DØ Experiment at Fermilab and Department of Physics, The Florida State University.

Jul 2001 M.Sc. in Physics, Department of Physics, University of Indonesia.

May 1999 B.Sc. in Physics, Department of Physics, University of Indonesia.

Principal Areas of Expertise

- High p_T physics at a hadron collider, with emphasis on lepton+jets+missing energy and multilepton+jets+missing energy final states of relevance to new phenomena searches, top quark physics, and Higgs physics. Experienced in using electrons, muons, jets, taus, tracks, missing energy, and $b-$quark jets in physics analysis.
- Real-time systems, online computing, data acquisition, control systems, and instrumentation. Experienced in maintaining, developing, and commissioning the control systems of large-scale experimental facility in high-energy physics.

Computing and Programming Skills

- Programming: Experienced and proficient in `Python`, `C++`, `C`, `Fortran`, Graphical User Interface (GUI) programming with `Tkinter`.
- Analysis framework: `ROOT`, `PyROOT` Python-ROOT interface.
- Platform/Environment: Unix/Linux and Windows. Multi-developer programming with `CVS`.
- Tools: `awk`, `sed`, `grep`, and others Unix/Linux tools.
- Numerical library: `CERNLIB`, `Numerical Recipes`™ (`Fortran` version).
- Database: `ORACLE`™ and structured query language (`SQL`).

Technical Skills

- Real-time and control systems framework: Experimental Physics and Industrial Control Systems (EPICS), EPICS-Python interface, `VxWorks` real-time operating systems, ETM PVSS II, CERN JCOP Framework Tools, CERN DIM.
- Real-time and control systems hardware: MIL-STD-1553 interface, Motorola MVME single board computer, ATLAS CANBus Embedded Local Monitoring Board (ELMB).

Language Skills

- Bahasa Indonesia: native.
- English: fluent.
- French: learning.

Summer School and other Training

Feb 2009 PVSS and CERN JCOP Framework Course. CERN Technical Training, Geneva, Switzerland.

Jun 2004 Theoretical Advanced Study Institute in Elementary Particle Physics (TASI) 2004: *Physics in* $D \geq 4$, Boulder, Colorado. Sole participant with background in experimental high energy physics.

Jun 2002 Accelerated C++: A Short Course in Practical Programming by Example. Fermilab Training, Batavia, IL.

Current and Past Positions

Dec 2008 – now Postdoctoral Scholar, Department of Physics, University of California, Riverside.

Feb 2008 – Nov 2008 Researcher, Department of Physics, The Florida State University.

May 2002 – Dec 2007 Research assistant, Department of Physics, The Florida State University.

Sep 2001 – Apr 2002 Teaching assistant, Department of Physics, The Florida State University

Feb 1998 – May 2001 Teaching and research assistant, Department of Physics, University of Indonesia.

Research Activities and Achievements

Top quark pair production cross-section in tau+lepton channel

Top quark pair production cross-section in ℓ+jets channel at the CERN Large Hadron Collider

Search for charged Higgs bosons in decays of top quark pairs at the Fermilab Tevatron

(Reference: `http://www-d0.fnal.gov/Run2Physics/WWW/results/prelim/TOP/T70/`, `http://www.fnal.gov/pub/today/archive_2008/today08-10-23.html`)

- Contribute the tau+lepton channel, the only appearance channel in search for tauonic charged Higgs.
- Develop analysis tools to enforce non-overlapping condition between tau+lepton selection criteria and lepton+jets selection criteria.
- First analysis to set the limit on BR($t \to H^{\pm} b \to \tau \nu_{\tau} b$), independently of the top quark pair production cross-section. Set the best limit on BR($t \to H^{\pm} b \to \tau \nu_{\tau} b$).

Top quark pair production cross-section in tau+lepton channel at the Fermilab Tevatron

(Reference: `http://www-d0.fnal.gov/Run2Physics/WWW/results/prelim/TOP/T58/`, `http://www-d0.fnal.gov/Run2Physics/WWW/results/prelim/TOP/T68/`)

- Pioneer, and develop analysis strategy in a new physics analysis channel at DØ.
- Develop a library of code, of about 10,000 lines of code, written in `C++`, `Python`, and DØ run-time parameters to perform analysis in this channel.
- Set an upper limit on BR($t \to \tau\nu_\tau b$) within the context of the existence of a charged Higgs boson with mass close to m_W.

DØ Tau Identification Algorithm

- Implement a geometrical cut to discriminate taus and electrons, based on preshower information.

DØ Top Quark Physics Analysis Framework

- Process and prepare e+jets and μ+jets datasets from DØ Run IIa data for physics analysis.
- Prepare Monte Carlo datasets and provide Monte Carlo information for physics analysis.
- One of the authors of the `top_cafe` package, the common library of code for analyses within DØ Top Quark Physics Analysis Group.
- Generate Monte Carlo events with earlier versions (< 2.0) of ALPGEN for Winter 2004 analyses.

Kaon photoproduction from threshold to the high-energy region

- Develop a phenomenological model of kaon photoproduction on nucleon target for photon beam energy up to 16 GeV, as anticipation for the upgrade plan of 12 GeV electron beam at Jefferson Lab. Write a `Fortran` code to compute reaction amplitudes and physical observables.
- Write `Fortran` code to perform numerical fit of physical observables to experimental data, using `CERNLIB MINUIT`. Extract hadronic coupling constants and resonance parameters from fit.

Gerasimov-Drell-Hearn (GDH) sum rule in kaon photoproduction

(Reference: Phys. Rev. **C60**, 028201 (1999)).

- First study of the GDH sum rule in the context of kaon photoproduction.
- Write `Fortran` code to perform sum rule integration from threshold to infinity.

Technical Work Activities and Achievements

CMS Cathode Strip Chamber (CSC) Detector Control Systems Group

- Debug, maintain, and develop slow controls applications written in ETM PVSS II.

DØ Controls and Monitoring Group and DØ Calorimeter Operations Group

- Debug, maintain, and develop slow controls applications written in `EPICS`, `Python`, and `Tkinter`. Write an integrated applications, consist of 15,000 lines of Python code, to control and monitor the operational status of the DØ calorimeter.
- Maintain controls systems hardware of the DØ calorimeter: MIL-STD-1553 interface, Motorola MVME single board computer running VxWorks^{TM} operating system, VME bus crate.

- Maintain ORACLE™ database of the DØ calorimeter hardware configurations.
- Debug and test software interface between Fermilab custom-built VME bus crate extension modules and Motorola MVME single board computer. Update all existing Fermilab custom-built modules to single board computers.
- Discover and solve some long-standing problems in the slow control systems of the DØ calorimeter. Reduce the amount of downtime in the operations of the DØ calorimeter.

DØ Detector Operations Group

- Perform control room shifts for all DØ sub-detectors: silicon detector, fiber tracker, calorimeter, muon system, and data acquisition.
- Responsible as 24/7 on-call expert on the DØ control systems. Work with shift crew and experts on other subsystems of the DØ detector to ensure 24/7 reliable working condition of the DØ detector.

Service and Volunteer Activities

ARSIP: Mirror Servers for Scientific Data

(Reference: `http://www.arsip.lipi.go.id`).

- Successfully established the following mirror sites with official approval from the original sites: Harvard-Smithsonian/NASA Astrophysics Data System, LBL Particle Data Group, and SLAC SPIRES.
- Currently the only mirror servers of scientific databases in Southeast Asia.

Himpunan Fisika Indonesia (Indonesian Physical Society)

- Maintain, and moderate discussions on, official mailing lists of Indonesian Physical Society.
- Advise undergraduate students in Indonesia regarding careers in physics and physics graduate studies in United States.
- Assist students and scientists in Indonesia to obtain literature published in scientific journals which are not accessible from Indonesia.
- Assist an Indonesian astronomer for his visit at Fermilab Experimental Astrophysics Group.

Teaching

Sep 2001 – Apr 2002	Teaching Assistant at Department of Physics, The Florida State University for the course Undergraduate Astronomy Laboratory.
Feb 2001	Instructor for Indonesian Physics Olympiad Team.
Feb 1998 – Dec 2000	Teaching Assistant at Department of Physics, University of Indonesia for the courses Undergraduate Physics Laboratory, Undergraduate Quantum Mechanics, and Graduate Quantum Mechanics.

Honors and Awards

Jun 2004	Fund for attending Theoretical Advanced Study Institute in Elementary Particle Physics (TASI2004), University of Colorado, Boulder, Colorado.
Sep 2000	Study in Netherland (STUNED) scholarship for graduate study at Department of Physics, University of Groningen, Netherland (declined).

Feb 2000 Award for international publication from University of Indonesia and University Research for Graduate Education (URGE) Consortium for Research in Natural Sciences. Youngest award winner.

Jun 1994 Invitation of admission from University of Indonesia (one of the top three higher education institutions in Indonesia), without taking National Examination for University Admission. This privilege is only granted to about 5% of the incoming first-year students at University of Indonesia.

Person writing letter of recommendation

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Other references

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Reference for work on DØ control systems.

Selected Works and Publications

Work in Progress

- Measurement of the $t\bar{t}$ production cross section , of ratios of $t\bar{t}$ cross sections and the mass of the top quark. To be submitted to Physical Review D Rapid Communications.

Preliminary Results with Significant Contributions

[1] DØ Collaboration, V. M. Abazov *et al.*, "A search for charged Higgs bosons in $t\bar{t}$ events." DØ Note 5715-CONF. Featured as *Results of the Week* in *Fermilab Today* on October 23, 2008., 2008. `http://www-d0.fnal.gov/Run2Physics/WWW/results/prelim/TOP/T70/`, `http://www.fnal.gov/pub/today/archive_2008/today08-10-23.html`.

[2] DØ Collaboration, V. M. Abazov *et al.*, "Measurement of $t\bar{t}$ Production Cross Section in the Lepton + Tau + b-jet(s) + Missing Transverse Energy Channel Using 1 fb^{-1} of Run II Data." DØ Note 5451-CONF, 2007. `http://www-d0.fnal.gov/Run2Physics/WWW/results/prelim/TOP/T58/`.

Refereed Publications with Significant Contributions

[1] DØ Collaboration, V. M. Abazov *et al.*, *Measurement of the $t\bar{t}$ production cross section and top quark mass extraction using dilepton events in $p\bar{p}$ collisions*, arXiV:0901.2137 [hep-ex]. Submitted to Physics Letters B.

[2] DØ Collaboration, V. M. Abazov *et al.*, *The upgraded DØ detector*, *Nucl. Instrum. Meth.* **A565** (2006) 463–537, physics/0507191.

[3] S. Sumowidagdo and T. Mart, *Kaon photoproduction on the nucleon: Contributions of kaon hyperon final states to the magnetic moment of the nucleon*, *Phys. Rev.* **C60** (1999) 028201, nucl-th/9906026.

As a member of DØ Collaboration, I have been in the author list of more than 150 refereed publications dated since 2005.

Publications in Conference Proceedings

[1] T. Mart, S. Sumowidagdo, D. Kusno, C. Bennhold, and H. Haberzettl, *Kaon photoproduction on the nucleon: Overview of some applications*, *Nucl. Phys.* **A684** (2001) 502–504, nucl-th/0008001. Prepared for the 16th International Conference on Few-Body Problems in Physics (FB 16), Taipei, Taiwan.

[2] T. Mart, S. Sumowidagdo, C. Bennhold, and H. Haberzettl, *Phenomenological aspects of kaon photoproduction on the nucleon*, in *Proceedings of the 2nd KEK-Tanashi International Symposium on Hadron and Nuclear Physics with Electromagnetic Probes*, pp. 113–118, 1999. nucl-th/0002036.

Presentations

1. *Measurement of top quark pair production cross-section in lepton plus hadronic tau channel*, presented at the Phenomenology '08 Symposium, April 28-30, 2008, Madison, Wisconsin, USA.
2. *Simultaneous measurement of the ratio* $\text{Br}(t \to Wb)/\text{Br}(t \to Wq)$ *and the top quark pair production cross-section with the DØ detector at* $\sqrt{s} = 1.96$ *TeV*, presented at Session J12. Top I at the 2008 April Meeting of the American Physical Society, April 12-15, 2008, St. Louis, Missouri, USA.
3. *Gerasimov-Drell-Hearn integral in kaon photoproduction*, presented at XVIII National Physics Symposium of the Indonesian Physical Society, April 25-27, 2000, Serpong, West Java, Indonesia.